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Underground Obstructions

By Warren Record, Sr.

Underground obstructions are any buried object or obstacle that interferes with our completing planned work. Some common underground obstructions are:

- Production lines
- Fire water lines
- Cooling tower water lines
- Electrical feeders
- Communication cables – fiber optic cables, phone lines, instrumentation lines
- Bell pile bases
- Foundation footings

In a “Greenfield” project, coming into contact with most of these objects, provided the unit hasn’t been commissioned, generates impacts that are primarily limited to cost and schedule. It’s usually the time and money required to fix the damage and then move on ... provided the line, cable, electrical feeder, etc., has not been commissioned.

“Live lines” are an entirely different kettle of fish. “The difference between men and boys is the price of their toys.”

Impacts from hitting in-service or “live” underground obstructions on Green or Brownfield work may include:

- Death
- Personal injury
- Major equipment damage
- Unit and/or entire refinery shutdown
- Minor equipment damage
- Environmental impact

Work Highlights

Mechanical Engineering

- *Mechanical and materials engineering support was provided regarding replacement of a storage tank bottom. The existing bottom had experienced severe corrosion issues over several years, actually holing through in less than five years after previous major repairs were done. Technical specifications were provided for a new double bottom design with a cathodic protection system, and an alternate approach that did not involve installing a double bottom.*

Process, Operations & Safety

- *Provided lube processing (Vacuum Unit/PDA/Extraction) and crude blend planning support for a domestic refiner processing local crudes.*
- *Assisting a major refiner with intellectual property database management.*
- *Provided pilot plant support associated with the assessment of pertinent design practices / engineering standards, and general process consultation.*
- *Providing licensing consultation with particular focus on hydroprocessing and catalytic dewaxing technology areas.*

While I've heard it said, "what doesn't kill you makes you stronger," I've never seen an underground obstruction event that made anyone stronger. In over 30 years of field work, I've never seen one underground obstruction event that had a positive consequence.

"We must be good at hitting underground obstructions because we find a way to do just that on nearly every major project."

Why?

Some of the "we are so good at it" are just excuses. Here are some of the "overused excuses":

1. "Whenever something can go wrong it will go wrong." This is better known as the "it's not my fault - shoulder shrug required" excuse.
2. "Down South, the folks talk so slow that by the time they ask for the permit the field work is complete." This is the "I went to work without a permit" excuse.
3. There's the $A + B = C$. Where A = time is money; B = time lost can never be recovered; and C = haste makes waste. This is the "We are in a hurry, get out of our way, here we go" excuse, and it nearly always results in a massive mistake.
4. The 5 P's: "Poor planning produces poor products." This quote is self explanatory.

In order to reverse the trend of hitting underground obstructions, eliminating and/or minimizing the possibility of this event must be a specific project goal in the execution plan. Then having identified this as a project goal, the execution team must develop detailed planning that specifically identifies what measures will be used to achieve this goal.

Some of the preventative measures that should be included in the field execution plan are:

1. Identify all known underground obstructions in a work area with highly visible markers immediately prior to start of work.
2. Do extensive underground survey (sonar, ground penetrating radar) immediately prior to start of work and mark the found obstructions with highly visible markers.
3. Hold field team – tool box meetings, and raise this particular risk to the high level risk category it deserves.
4. Hand dig or hydro vac in high risk areas.
 - A plan not followed is "an accident waiting to happen."
 - Plan the work - then work the plan.

Using the above suggestions will help minimize problems caused by undetected underground obstructions.

About the Author

Warren Record has over 28 years of experience in construction, turnaround planning/execution, operations, and operations supervision/management in petroleum refining – overseas as well as in the United States.

Please contact Vince Carucci (vcarucci@carmagen.com) if you'd like more information on Carmagen's expertise in this area.

